Cross River Transit

Summary report

Transport *for* London

This report has been produced by TfL

Further copies may be obtained from:
T*f*L – CRT
Windsor House, 42–50 Victoria Street,
London SW1H 0TL.
Telephone 020 7941 4084

October 2000

Contents

	Executive summary	2
1	Introduction	5
2	What are intermediate modes?	6
3	Background to intermediate mode studies	7
4	Objectives and route derivation	12
5	The proposal	15
6	The evaluation process	20
7	Results of evaluation	25
8	Comparison of intermediate mode schemes	42
9	Conclusions	47
10	The Way Forward	50

Executive summary

Cross River Transit (CRT) is one of a number of transport schemes that are intermediate between the bus and the Underground. They are intended to improve the quality, safety, and accessibility of public transport. The report sets out an assessment of the CRT project, which has been developed by LT/TfL in partnership with the CRP and the Boroughs.

The work has developed a proposal for a high-quality transit scheme, running through the heart of London, linking busy tourist centres, mainline railway stations, universities and employment opportunities with high density housing areas and major regeneration areas, such as the Elephant and Castle and the Kings Cross.

The scheme is dynamic, with a number of further development opportunities. Recent work co-sponsored by Lambeth Council has shown that the route can be developed via the Stockwell regeneration area to the Heart of Brixton project. Further work is in hand to develop this promising further extension.

The key results of the assessment of the scheme carried out in 1999-2000 are;

- The scheme produces environmental benefit. **Residential properties that would experience a reduction in traffic noise outnumber those that would experience an increase by more than 4 to 1.** CRT provides reductions in the amount of all local and global pollutants. There would be considerable net savings in energy consumption as a result of the transfer of trips from private cars to public transport and from diesel buses to electric vehicles, notwithstanding any lengthened motor trips that would have to be made as a result of traffic calming measures.
- The scheme is designed to run within existing highway boundaries for most of its length with demolition minimised. The rebuilding of the Elephant & Castle and the consequential land clearance here and in North Peckham does allow improved alignments to be incorporated in the scheme. **The only loss of green space is confined to a strip across Burgess Park.**
- Overall there would be a slight improvement in safety, largely caused by a shift from the private car to public transport in the electric vehicle options.
- The CRT stops and vehicles would be covered by CCTV, leading to up to 27 million passengers per year benefiting from improved travel security.
- **Forecast annual ridership is up to 70m+ on the tram option.**
- **Public transport users would experience a reduction in travel times of up to 10 million passenger-hours per year.**

This outweighs the increases in travel time for private transport users by a factor of nearly 4 to 1.

- Capital costs have been estimated as up to £268million for the most-expensive (tram) option. **The lower capital cost of the bus options is more than outweighed by their higher annual operating costs over the life of the project.**
- Despite the healthy ridership predictions and the significant modal shift predicted for the tram option the overall cost;benefit ratio is depressed by the disbenefit experienced by the far smaller number of private vehicle users. **Only the tram option has a ratio of 1:1. If this disbenefit is discounted as part of the policy to discourage private car use in central London the cost;benefit ratios become far stronger, with the tram achieving 3.6;1.**
- CRT would provide significant increases in accessibility in the Peckham and Elephant & Castle areas. Smaller benefits are felt at many other points along the route.
- Severance would be reduced by a reduction in private traffic and a diversion of some of the remainder away from the CRT area. The length of road experiencing a large increase in traffic and severance is equal to only 10% of the length experiencing a large reduction.
- **These figures were calculated before any allowance was made for additional traffic reduction in the central area as a result of Congestion Charging.**
- The scheme mostly runs on highways where parking is already severely restricted. Where parking and servicing is permitted the design of the scheme has ensured that there is no net loss of parking in any given area.
- The scheme improves public transport accessibility to regeneration sites. The increase of population within 30 minutes of Waterloo and Elephant & Castle is significant.
- CRT will be an important component in achieving regeneration. It will link the development sites and areas of deprivation into existing residential, employment, commercial and transport nodes within the buoyant central London area.
- It is estimated that deprived population within the area amounts to 140,000 people, they will benefit from increased public transport accessibility.
- The scheme will benefit more people indirectly by easing congestion on major sections of the Underground.

CRT would provide significant benefits in improving circulation in central London, assisting in the regeneration of a number of major sites, improving public transport accessibility for a disadvantaged population and improving the environment. This can only be achieved by providing a high-quality, reliable public transport system. This will be provided in part by TfL and its concessionaires providing high quality vehicles and infrastructure, but the other part will be provided by the highway authorities introducing -and enforcing- traffic management schemes to ensure that busy public transport services can operate without delays due to traffic congestion and parked vehicles. **The studies showed that only the electric modes could provide the benefits, with trams giving the best overall balance.**

TfL has decided to proceed to the next phase of the CRT – preliminary public consultation. This will establish the level of public support for the scheme. TfL will also be gauging the scope of private sector interest in CRT. This information will be used to inform the Mayor and TfL as to the best way to proceed with the further development and implementation of the scheme.

1 Introduction

This summary report contains the results of the multi-criteria assessment of Cross River Transit (CRT). This work was carried out in 1998-9. CRT is a dynamic scheme and numerous developments have taken place since the scheme was assessed. This report therefore should be considered as a 'snap shot' of the project as it stood at that time.

Later developments have included further development proposals at Kings Cross, and Elephant and Castle; and the extension of the system at Brixton. It is to be expected that all these developments will lead to a significant increase in demand for the system and benefits to be derived from it.

Other developments, such as the proposed introduction of central London congestion charging, will have an effect on private vehicle flows in the central area and along approach roads. It is to be expected that reduction in vehicle flows will alter the traffic impact assessment of CRT. A new traffic impact study, using the latest data and modelling, is currently underway. The results of these subsequent changes will be reported later.

2 What are intermediate modes?

London's public transport network is largely made up of heavy rail systems (Underground and Railtrack), bus services and taxis. However, throughout the world, a number of alternative transport modes, known as intermediate modes, are being introduced in a variety of situations, in a bid to improve the image and performance of public transport and to attract private vehicle users on to public transport. Intermediate public transport modes are those with costs and capacities lying between heavy rail and bus. They include light rail systems, tramways, busways (with and without vehicle guidance), trolley buses and unconventional bus technologies such as dual mode electric/diesel vehicles (duobuses).

Within London, the Docklands Light Railway (DLR - a fully segregated automatic light railway), Croydon Tramlink (light rail with street running) and Millennium Transit are examples of intermediate modes. Outside London, new light rail systems have been constructed in Manchester, Sheffield and Birmingham, while guided buses run in Leeds and Ipswich. Recently, the Manchester light rail system (Metrolink) was extended and construction of a new light rail system serving Nottingham has commenced. Following the successful introduction of sections of guided busways in Leeds, plans are now being developed to extend this system to other parts of the city and to build a new tramway.

Although intermediate modes have a wide range of characteristics, there are no hard and fast rules in assessing which is the most appropriate in any given situation and as a result, in every case, individual site characteristics, local policy objectives and priorities need to be taken into account in selecting the preferred type. For example, with levels of emissions, diesel vehicles produce particulates at source, while electric vehicles are emission-free at the point of operation. However many electric vehicles impose environmental intrusion by requiring overhead electrification equipment in the streets while the construction-related impacts of some fixed track systems are very high.

Light rail – Croydon Tramlink

Trolleybus

'Bendy' bus

3 Background to intermediate mode studies

There is now widespread support for the improvement of public transport in London and the provision of an attractive alternative to the car, within the context of improved accessibility and sustainable economic development.

Within this policy context, the importance of the bus, both in terms of the number of passengers carried and its inherent flexibility in meeting a wide range of transport roles, has been firmly acknowledged in recent key policy documents. The development of the Priority (Red) Route network, on trunk and main roads, and the London Bus Priority Network (LBPN), on main and secondary roads, has formed the basis of a London-wide strategy to protect buses from the worst effects of congestion.

Whilst the Priority (Red) Routes and LBPN programmes are already delivering significant benefits to passengers, these programmes have been limited by the degree to which it has been deemed acceptable to restrain other road users. Local authorities however, are now required to prepare statements on how they will reduce traffic and improve air quality in their areas and are now developing measures to achieve this.

These measures will allow road space to be re-allocated in favour of public transport and permit the introduction of more radical forms of priority. Although this approach is often portrayed as being an attempt to 'punish' car drivers, in reality it reflects the fact that the level of priority given to surface public transport primarily determines its performance and therefore its attractiveness as an alternative to the private car. As a result, although road space re-allocation may cause some delays to car users, it should also lead to an overall improvement in both the efficiency of the transport network and the environment.

Tram only street – Grenoble

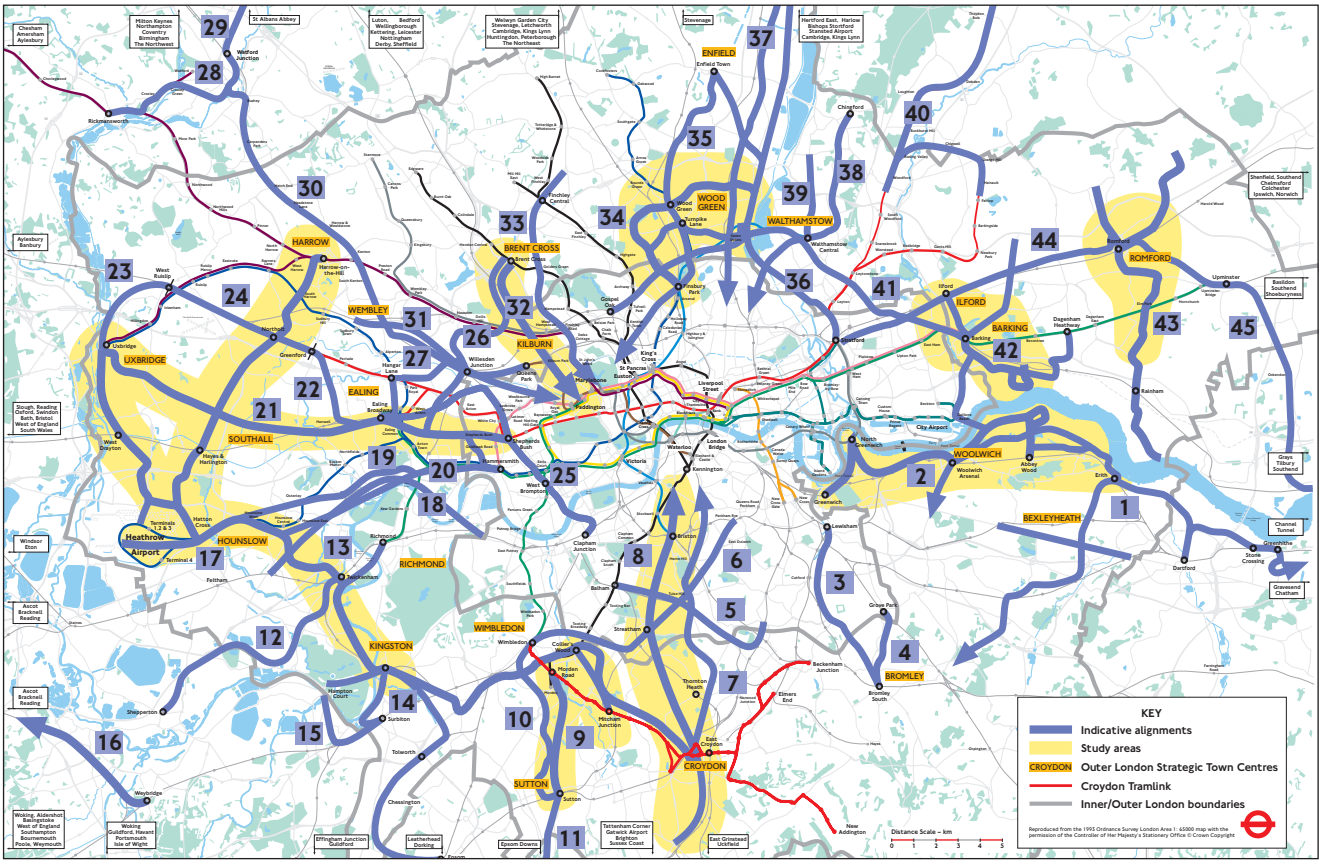
Bus priority – Shepherd's Bush, London

New ideas for Public Transport in outer London

In 1994, faced with a growing willingness from both national and local politicians to consider in principle the issue of road space re-allocation, along with the successful implementation of the DLR and the development of the Croydon Tramlink project, LT commenced a strategic review of possible areas and transport corridors in outer London that might benefit from the introduction of intermediate modes. Outer London is currently the area of London of greatest challenge to public transport – residential densities are low, car ownership and use are high and growing, trip patterns are diverse and the public transport market share is the lowest in London.

Through consultation with the outer London Boroughs and analysis of present-day demand on the bus and rail networks, around 60 ideas were generated which were then grouped into 45 areas for review. These 45 areas were then assessed for their potential for intermediate modes, using a largely qualitative method and comparative framework, against indicators agreed with the local authorities.

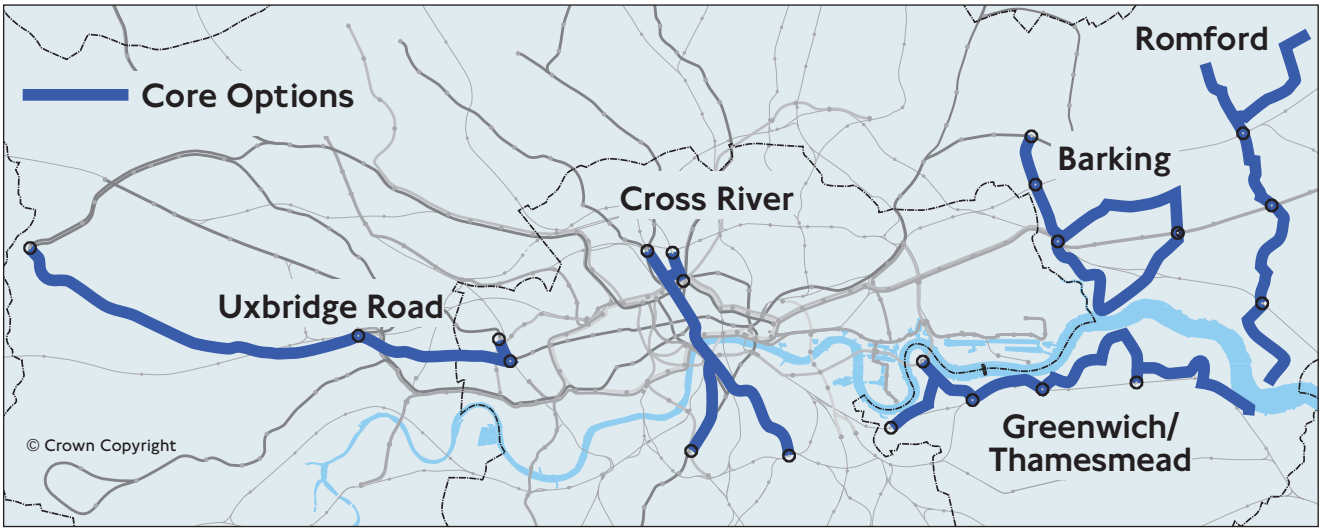
Intermediate Modes in London: initial corridors for review



Study area	Conclusion
Thamesmead/ Greenwich	High potential for segregation in development areas, consider bus-based system
Barking	High potential for segregation in development areas, consider bus-based system
Romford	Consider track-based system
Uxbridge Road	Consider track-based system

This further development stage, the "Project Definition" stage commenced in late 1997 under the joint control of LT and the relevant local authorities. The aim of this stage in the project was to identify the detailed traffic management issues required to secure the priority for the intermediate mode and to produce a detailed assessment of the likely costs and benefits of constructing the intermediate mode. The result of the assessment for each of these areas is the subject of its own report published by TfL.

Intermediate Modes in London: schemes identified for Project Definition stage in 1997



Along with these 3 outer London projects, TfL is a member of the Cross River Partnership and has worked with the partners to develop the central London Cross River Transit project (CRT). The CRT would have a core route from Euston to Waterloo, with branches in the north to Camden Town and King's Cross and in the south one branch would serve Peckham via Elephant & Castle, with a second branch serving Stockwell.

The London Borough of Lambeth has now launched a proposal for the regeneration of Brixton town centre, with improved public transport provision and local traffic management being seen as key to the regeneration proposals. As part of the improved public transport provision, an extension of CRT from Stockwell to Brixton has been identified as an possible option, and work is currently underway to evaluate the case for this additional extension. However, the results of this assessment are not covered in this report.

The Cross River Transit project stems from the formation of the Cross River Partnership, whose aim is to regenerate the south side of the river Thames in central London. As a means of achieving this aim, the Cross River Partnership developed a transport strategy for the area which included the construction of an intermediate mode scheme between Waterloo and Euston stations. However, later development work by the Partnership has resulted in the corridor served by this project being extended both to the north and the south in order to provide congestion relief to sections of the Underground in central London as well improved accessibility to areas of inner London such as Peckham and Camden Town.

CRT has been developed to the same level of detail as the 3 outer London studies and like them, its success depends upon the local authorities agreeing to re-allocate road space in favour of public transport.

London Bus Initiative

Apart from the intermediate mode studies discussed here, other projects are underway to enhance the attractiveness of bus travel in different parts of London. The most significant of these projects is the London Bus Initiative (LBI) which aims to improve the quality of bus travel on 25 strategically important bus routes, collectively called BusPlus routes. Under this project, each of these routes will have a combination of measures applied which as well as bus priority measures may include the introduction of higher quality bus vehicles and bus stops as well as improved driver training. A number of these BusPlus routes serve corridors such as the Edgware Road and between Harrow and Heathrow Airport which were examined as part of the earlier strategic intermediate mode corridor studies and identified as having significant potential.

Work on the LBI is proceeding and is seen as complementary to the intermediate mode projects. Some LBI projects may act as precursors to them, by providing an early and significant increase in transport provision during the development and approvals phases of the intermediate mode schemes. Conversely, parts of the full intermediate mode scheme alignments would also be available to buses, thereby enhancing their performance.

4 Objectives and route derivation

Development of Cross River Transit

The Cross River Partnership was created in 1995. Members of the Partnership include the City of London, City of Westminster, the London Boroughs of Lambeth and Southwark, as well as a number of organisations including Railtrack, the London Tourist Board, the South Bank Employers Group and Transport for London. LB Camden is also associated with the CRP in developing Cross River Transit.

The main aims and objectives of the Partnership are:

- to maintain and strengthen links between key areas on the north and south banks of the River Thames;
- to maintain and extend the transformation of the south side of the River Thames as a centre for business, leisure and tourism and for residential communities;
- to work with residents, businesses and local communities to ensure that they have access to the benefits of regeneration.

In order to assist in the realisation of these aims and objectives, the Partnership developed the Cross River Integrated Public Transport Strategy (CRIPTS) to improve accessibility by both foot and by public transport between the northern and southern sides of the river Thames. A number of initiatives have been developed, including the creation of new river services and encouraging walking between new attractions, workplaces and transport interchanges on the South Bank. In addition, two new innovative public transport schemes have been proposed – ECOBUS and Cross River Transit.

ECOBUS was planned to improve public transport on an east-west axis through the Cross River Partnership area by linking Covent Garden with the Tower of London via the South Bank. The scheme would provide both economic and environmental benefits by improving cross-river links and accessibility on the south side of the river. Local residents would also benefit from a bus service that would get close to riverside residential communities.

Cross River Transit was developed to improve public transport on a north-south axis and would serve the central London corridor between Euston and Waterloo stations. Apart from improving overall accessibility, it was recognised that this corridor is an important tourist area and that CRT could have a major role to play in attracting tourists from the overcrowded areas on the north bank of the Thames, such as Covent Garden, to a revitalised South Bank. In addition, it was recognised that CRT could offer an attractive alternative to the various Underground lines in the corridor, many of which are overcrowded, particularly in the peak period .

Consideration of the wider potential benefits of CRT resulted in the enlargement of the proposed route beyond Euston to Waterloo corridor to cover two northern extensions to Camden Town and King's Cross

Development Lands and two southern extensions to Stockwell and Peckham.

The extension to Camden Town was proposed in the light of the major capacity problems facing Camden Town underground station. This station has very high passenger flows, particularly at the weekend when the nearby Camden Market is at its busiest. As a result, it was recognised that CRT, with its links to other tourist "honey pots" in central London, could have a role to play in providing additional public transport capacity to the area as providing local commuters with an alternative to the Northern line. The route would also provide an opportunity to restrain high traffic flows in the Camden Town area, using the reallocated space to provide two-way bus facilities in Camden High Street, improved pedestrian space and designated delivery bays as well as a route for CRT.

The second northern branch to King's Cross and St Pancras stations and the surrounding development lands was conceived as a way to provide additional dispersal capacity from these stations as well as improving accessibility to and from the development lands. Both these stations are already major entry points into London and their importance will increase when the Channel Tunnel Rail Link, with its associated Kent commuter services, is extended to St Pancras and Thameslink 2000 is constructed.

In the south, the extension to Peckham was a response to the relatively poor accessibility of this very densely populated part of inner south London, particularly by rail. Significant regeneration work is currently underway in North Peckham and it was recognised that this work could provide an opportunity to plan a largely segregated route for CRT through the area. In addition, the proposals for the redevelopment of the Elephant & Castle area and the aspiration to see the whole area to the north of the Elephant & Castle incorporated into the central London property market, highlighted the need for improved transport links, northward into central London and south into the residential hinterland.

The second southern extension to Stockwell is also a reflection of the relatively poor accessibility of parts of the corridor between Stockwell and Waterloo. In addition, the Underground services in the area are extremely crowded and the provision of additional public transport capacity at Stockwell could have major benefits to users of both the Northern and Victoria lines Further work on the feasibility of extending the route via Stockwell Green to the heart of Brixton regeneration area is now underway.

Key centres, tourist sites and development areas identified along the Cross River Transit corridor are shown in the map below.

North West Scotland
Luton Bedford East Midlands
Cambridge The North East Scotland
Camden Town
King's Cross North
Mornington Crescent
King's Cross St Pancras
Euston
Tavistock Square
London University
Russell Square
British Museum
Holborn
CITY OF WESTMINSTER
London School of Economics
Aldwych
Covent Garden
National Gallery
Charing Cross
Waterloo Bridge
Hungerford Bridge
Oxo Tower
South Bank
Blackfriars
Moorgate
CITY OF LONDON
St Paul's Cathedral
Liverpool Street
Fenchurch Street
Cannon Street
Globe Theatre
Tate Bankside (2000)
London Bridge
Waterloo International
Waterloo
Green Park
Westminster Bridge
Houses of Parliament
Lambeth North
St George's Circus
South London University
Kent
Elephant & Castle North
Elephant & Castle South
Victoria
Tate Gallery Millbank
Paris The South West
LAMBETH
Catesby Street
Kennington Cross
Albany Road
Longhope Close
Oval
Diamond Street
Sumner Road
Albert Square
SOUTHWARK
Croydon Gatwick Brighton
Peckham High Street
Stockwell
Peckham Rye Lane
Kent
Clapham Victoria
Key
Cross River Transit and potential stops
Interchange with Underground
Interchange with National Rail
Roads
Railtrack
Reproduced from the 1993 Ordnance Survey London Area 1:65000 map with the permission of the Controller of Her Majesty's Stationery Office © Crown copyright. Licence Number AL5112A/0001. London Transport Planning, 55 Broadway, London SW1 0BD.

5 The proposal

The aim of the Project Definition stage was to define the CRT system in greater detail than done previously. This involved identifying an alignment and then developing the infrastructure and traffic management measures necessary for achieving a high level of priority for the CRT over other traffic. This allowed the benefits of the traffic priority measures to passengers to be calculated as well as identifying the effects of these measures on private vehicle traffic.

Description of alignment

An alignment for CRT has been developed that involves the provision of traffic priority measures for CRT on a "core" route between Waterloo and Euston, with two extensions at the northern end to Camden Town and King's Cross and two southern extensions to Peckham Rye and Stockwell. A description of the alignment along with proposed stops (shown in bold) is described below:

Camden Town/King's Cross to Euston

Cross River Transit would start and terminate adjacent to **Camden Town station** in Camden High Street, giving a short interchange to and from LUL services. CRT would then run south along a Transit mall in Camden High Street to Eversholt Street with a stop outside **Mornington Crescent station**. CRT would then run the length of a traffic calmed Eversholt Street with a stop located at the Collonade next to **Euston station**.

The branch from King's Cross would join the branch from Camden Town at Phoenix Road, north of Euston station. Due to the still uncertain nature of the developments around King's Cross it has not been possible to carry out the detailed planning of this alignment. Nevertheless, at present it is envisaged that this branch would use Phoenix Road and pass under the extended St Pancras station to access the King's Cross station and King's Cross railway land development areas.

Euston to Waterloo

From Euston station, CRT would cross Euston Road, using the existing traffic light phases, and run south along Upper Woburn Place to stop on the eastern side of **Tavistock Square** and then down Woburn Place to a stop on the eastern side of **Russell Square**, giving a short interchange to Russell Square station. From there the alignment would run down Southampton Row to a stop at **Holborn station**, located in a new pedestrian area just north of the junction of Southampton Row and High Holborn. After crossing High Holborn, CRT would run down Kingsway and the western side of Aldwych, with a stop located close to the **Waldorf Hotel**, and then cross the Strand to reach Waterloo Bridge. After crossing Waterloo Bridge, a stop would be provided next to the **Royal National Theatre and South Bank arts complex**.

At Waterloo station southbound CRT services would run down Waterloo Road with a stop located outside **Waterloo station** at the junction of Waterloo Road and Alaska Street. Northbound services would run via Mepham Street with a stop for **Waterloo station** located next to York Road. Alternative options can be developed to match development proposals for Waterloo station.

Waterloo to Peckham

From Waterloo station, the Peckham branch would run down Waterloo Road to **St George's Circus** with a stop located close at the junction of Waterloo Road and Westminster Bridge Road. CRT would then run via London Road to a stop at **Elephant & Castle** next to the Bakerloo Line station entrance. Due to the comprehensive plans currently under preparation for the redevelopment of the Elephant & Castle area, the precise alignment for CRT in this area has not yet been defined. However CRT would emerge from the Elephant & Castle via Walworth Road and run down **Heygate Street** to a stop at the junction with Rodney Place. CRT would then run down **Rodney Street** to a stop at the junction with Catesby Street, before following Flint Street and Thurlow Street to reach Albany Road. Two stops would be located on **Thurlow Street** – one close to the junction with East Street and one at the junction with Albany Road.

After crossing Albany Road, CRT would cross **Burgess Park** and St George's Way to reach **Chandler Way (North)** and **Commercial Way**. CRT would then run up Kelly Avenue to reach Peckham High Street serving the new civic centre area around the award winning Peckham Library. CRT would terminate in an integrated facility at Peckham Bus station.

Waterloo to Stockwell

From Waterloo station, the Stockwell branch of CRT would run down Baylis Road to a stop at **Lambeth North station**. It would then cross Westminster Bridge Road and run the length of Kennington Road. with stops at both **Lambeth Road** and **Kennington Lane**. CRT would then run south down Kennington Park Road to a stop outside **Oval station** before following Clapham Road to terminate at **Stockwell station**. On **Clapham Road** an intermediate stop would be located at the junction with Caldwell Street. The further extension to Brixton would run via a traffic-calmed Stockwell Road to terminate next to the Brixton Recreation Centre, Brixton Station and the urban regeneration area.

Modes considered in this study

This study has considered both the introduction of bus-based and fixed-track (tram or light rail) systems on Cross River Transit. For the bus-based systems, both electrically powered (trolley bus) and diesel powered options have been assessed.

Integration with existing bus and rail services

Although no detailed planning has been carried out, it is TfL's view that CRT services should only be introduced as part of an integrated transport network that takes into account the role of other modes of transport.

Interchange between CRT and the National Rail Network (NRN) services would be provided at a number of stations including Kings Cross, Euston, Waterloo and Elephant& Castle. In addition, interchange would be possible between CRT and LUL services at Camden Town, Russell Square, Holborn, Lambeth North, Oval and Stockwell. At each of these interchange locations, improvements would be made as part of the Cross River Transit project to provide easier and safer connections between services.

Introduction of CRT would have an impact on bus services within the corridor and TfL recognises that further work is required to integrate CRT services with the conventional bus network in the area. TfL believe that there are no reasons why CRT and conventional bus services cannot both use the alignment, although buses would be unable to use CRT stops and would require separate off-line stop facilities. As a result, a number of conventional bus services would benefit from the provision of the CRT alignment, although it also possible that a number of parallel bus services would also be withdrawn to avoid duplication of services in the CRT corridor.

In order to derived the optimum pattern of both CRT and conventional bus services in the study area, TfL recognises that further work is required. In planning these CRT services and any accompanying changes to the conventional bus network, TfL will use the same criteria that are currently employed to plan the bus network, namely that any network should be **comprehensive**, **frequent**, **simple**, **reliable**, **integrated** and **justified.**

Traffic management requirements

With the exception of a small number of location such as Burgess Park, the majority of the proposed CRT route would run on existing streets and the alignment has been devised using a mixture of segregation, protected lanes and traffic management measures. These measures are required to ensure that CRT would achieve priority over other traffic and parked cars.

The level of priority given to CRT would be the major factor determining the performance and therefore success of the project. Providing high priority for CRT (and conventional bus services) would protect these services from the effects of road congestion and lead to reduced journey times as well as improved reliability.

In a large number of locations the traffic management measures would consist of imposing stopping restrictions on other vehicles to ensure an unimpeded journey for CRT. At locations where stopping restrictions are proposed, TfL has identified sites for alternative parking bays and loading facilities. Other measures would include limiting traffic - other than

public transport – to local access and deliveries, eliminating rat-running, non-local traffic. This has been introduced with some success on parts of the Croydon Tramlink.

Network-wide, CRT would receive signal priority over other traffic at the majority of traffic junctions. This priority would be balanced with consideration for the needs of traffic crossing the CRT alignment and the effects have been included in the evaluation. The extremely high level of frequency required for the trolley bus option may be difficult to sustain and could lead to severe problems at priority signalised junctions.

Stops

CRT stops will be designed to a high specification and would allow level boarding on to CRT vehicles by the provision of low platforms. Stops would include high quality shelters, CCTV surveillance, real time passenger information, two-way intercom facilities and ticket vending machines.

Although conventional buses with off-bus ticketing and CRT vehicles would be able to share the CRT alignment, buses would be unable to share stops with CRT vehicles. This is because conventional buses are not designed to operate with platform-type stops and as a result, there would be a risk of the bus striking the edge of the CRT platform. However, off line bus stops would be located close or adjacent to the CRT stops.

Utility removal

Allowance has been made within the cost estimates of CRT for the removal of the utilities from underneath the CRT alignment. However, due to a lack of detailed information on the precise nature and number of utilities located below the alignment, the costs assumed in this study should be viewed as being illustrative only. For the diesel bus-based CRT options, a lower cost of utility removal has been assumed due to their ability to follow local diversions. Obviously due to the fixed nature of tram tracks, all utilities would require to be removed from underneath the alignment for this option and as a result a higher utility removal cost has been assumed.

The permanent removal of utilities from the CRT alignment would be vital to protect the tram option from service suspensions due to road works on the alignment and although not so critical for the bus options, would still reduce the number of disruptions to these services as well as maintaining the quality of the road surface (and therefore ride quality of CRT) and service reliability.

Vehicle guidance

The traffic management proposals for CRT assume that services would operate through pedestrianised areas such as at Camden Town. In such areas it is probable that the non-tram based CRT options will need to be fitted with control to ensure that they define a consistent "swept path" and as a result, the relevant CRT vehicles have been assumed to be equipped with a guidance system. During the development of the CRT options, the assumption that the entire CRT alignment would be fitted with a guidance system was adopted. The main reason for doing this was to "capture" the benefits of close and accurate docking at stops that such systems would make possible.

Within the limits of this study it has not been possible to specify exactly the type of guidance system that would be adopted. However, the system would not resemble the kerb-guided systems already in operation in Leeds and Ipswich as these are not suitable for use in pedestrianised areas. However, it should be noted that the alternative electronic form of guidance is a new technology and remains unproven in a passenger operating environment. As a result, considerable research into its development is still taking place.

Depot facilities

Allowance has been made within the Cross River Transit cost estimates for the construction of a dedicated depot facility to store and service CRT vehicles. At present, no location for this depot has been identified, although it is estimated that a 40,000 sq metre plot of land would be required at a site close to the alignment to accommodate this facility. A possible location for this depot would be on the development lands to the north of King's Cross station.

6 The evaluation process

Outline of evaluation process

The evaluation method selected for Transit is the Multi-Criteria Assessment Framework (MCAF) that was developed by LT. Although the concept of multi-criteria assessment is not new, it is becoming more accepted as a more-embracing evaluation technique than the more conventional cost-benefit analysis approach, due to the increasing recognition that many of the impacts of transport schemes are beyond monetisation and so must be excluded from cost-benefit analysis.

"We are developing a new approach to the appraisal of different solutions to transport problems. This is designed to draw together the large amount of information collected as part of the appraisal of transport problem and alternative solutions. This information is set against the five criteria which we have adopted for the review of trunk roads ie integration, safety, economy, environment and accessibility."

Source: Section 4.195, A New Deal for Transport: Better for Everyone, DETR, 1998

The use of multi-criteria assessment has been given added impetus by the Government's 1998 White Paper on Transport which emphasises the five strategic objectives of Government transport policy – **environment**, **safety**, **economic**, **accessibility** and **integration**. These objectives are more wide-ranging than those that would be captured by more conventional evaluation methods. On the basis of these strategic policy objectives, the Government has devised a new approach to appraisal that summarises the achievement of schemes against these objectives. This allows a comparison to be made by decision-makers between schemes on a range of appropriate indicators that include, but do not give undue prominence to, monetary ones. Initially devised for highway schemes, the New Approach to Appraisal has now been adapted to multi-mode situations, as documented in the Department of Environment, Transport and Regions' (DETR) Guidelines on Multi-Modal Modelling Studies.

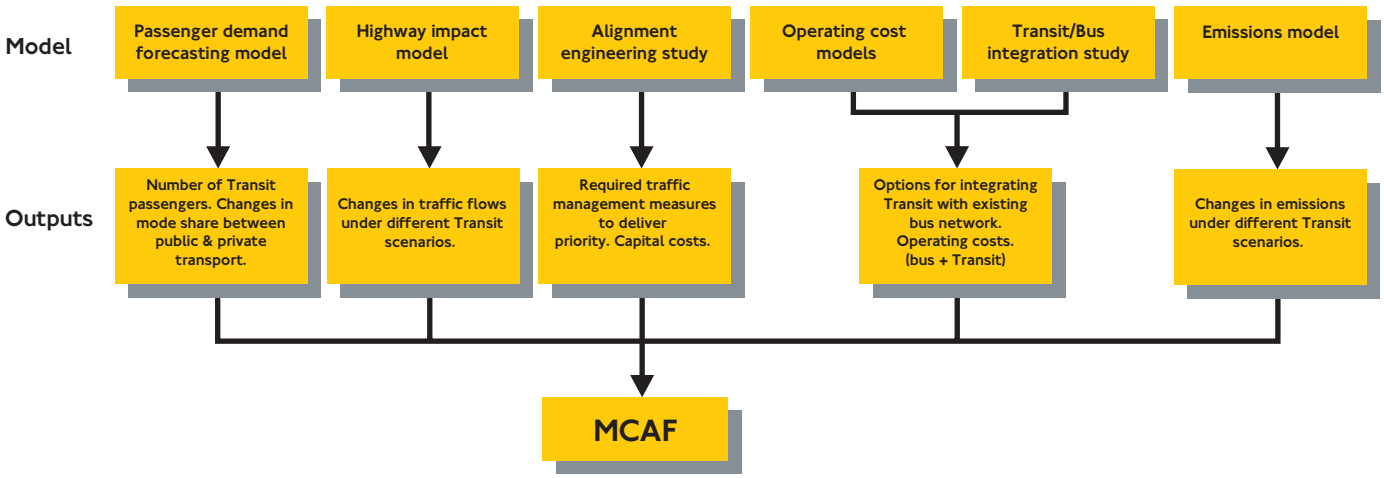
The LT MCAF was developed to be as consistent as possible with the Government's new approach, although a number of 'bespoke' aspects were introduced for its use in intermediate modes. The main appraisal criteria for the MCAF, along with selected indicators, are shown in the table below.

MCAF criteria and indicators

Criteria	Sub-criteria	Indicators
1 Environmental impact	Natural environment	Noise, local air pollution, global emissions, energy and fuel consumption, land-take, townscape, ecology
2 Safety and security	Accidents and personal security	Public and private transport accidents, personal security
3 Economic	Costs, time savings and revenue	Capital and operating costs, public and private use, public and private journey times, revenue, cost-benefit analysis
	Transport capacity	Capacity of corridor, crowding, frequency
4 Accessibility	Public transport accessibility	Pedestrian access to public transport, access to local centres
	Accessibility to other modes	Community severance, pedestrian space, parking and servicing access
5 Integration	Integration with other modes	Interface with other modes
	Accessibility impacts on regeneration and social inclusion	Access to development sites, access to deprived areas, access to employment
	Other local policy/plans Regional economic impact	Local policies, tourism National/EU objectives

MCAF application within overall scope of project

A number of individual studies were carried out to produce the data necessary for the MCAF evaluation. The figure below illustrates the main outputs of each of these studies, while details of each of these areas of work are outlined in more detail below.


Model
Passenger demand forecasting model
Highway impact model
Alignment engineering study
Operating cost models
Transit/Bus integration study
Emissions model
Outputs
Number of Transit passengers. Changes in mode share between public & private transport.
Changes in traffic flows under different Transit scenarios.
Required traffic management measures to deliver priority. Capital costs.
Options for integrating Transit with existing bus network. Operating costs. (bus + Transit)
Changes in emissions under different Transit scenarios.
MCAF

Passenger demand forecasting model

LT commissioned the construction of a forecasting model to predict the likely demand for CRT. This model was built to predict demand for a future year and includes an allowance for growth in public transport demand above current levels. In addition, a number of improvements to the public transport network were assumed to have been completed prior to the opening of CRT, in particular increases in the service frequency operated on the Northern Line which serves parts of the same corridor as CRT.

All tests predict healthy levels of demand for CRT, both in the peak and off-peak periods, along all sections of the alignment. Although the majority of passengers on CRT would be existing public transport users, the model also forecasts that a significant number of car drivers would switch to public transport, as well as new trips created by the improved accessibility generated by CRT.

Introduction of CRT services are forecast to result in significant reductions in levels of crowding on London Underground services in Central London, particularly on the Northern, Victoria and Piccadilly Lines. Apart from the reducing the number of passengers travelling on crowded conditions on trains, additional benefits would result from reduced levels of crowding in stations.

Highway impact model

A SATURN model was used to assess the likely traffic impacts of CRT over a wide area of central and inner London, particularly the redistribution and journey time effects of restricting private vehicle access to certain sections of the CRT alignment. It was assumed in this analysis that by the time CRT was operational, a number of changes would have been to highway arrangements along the alignment, particularly the Camden Town traffic management scheme which would involve the closure of Camden High Street to traffic between Camden Town station and Hawley Crescent.

The SATURN model also assumed that the World Squares Masterplan (as planned in 1999) would have been implemented by the time CRT was operational, involving the closure of the north side of Trafalgar Square to traffic, two-way traffic on the south side of the Square and the closure of the south side of Parliament Square with two-way traffic on other parts of the Square.

It has been assumed that the implementation of the World Squares Masterplan would require traffic management measures over a wider area of central London. In the model, the effects of these measures were assumed to lead to a reduction in the number of private vehicle trips ending within the Inner Ring Road of around 7%.

The results of the analysis show that the overall impacts of the CRT proposals are relatively small and that the majority of private vehicle journeys would be unaffected by these proposals. In the worst-case scenario - where no car-drivers switch to using CRT or travel at other times or to different destinations – overall private vehicle travel times would increase by less than 3% within the study area.

Nevertheless, the traffic priority measures introduced for CRT would lead to changes in the routes that private vehicle drivers would use to make their journeys. Significant reductions would occur in private vehicle flows along the alignment, with corresponding increases on road such as Stamford Street, York Road, the Old Kent Road, Blackfriars Bridge and Grays Inn Road. The main changes in highway flows are summarised in the map shown below.

In addition, changes in these highway flows could result in the creation of local "hot spots" with increased junction delays at locations such as Borough High Street, Victoria, Vauxhall Cross and Kings Cross (Pancras Road). It is anticipated that traffic signal optimisation, which was not examined in this study, could be used to facilitate the easier movement of traffic and reduce delays at key pinch points.

A number of sensitivity tests were carried out using the highway impact model to assess the effects of introducing CRT after additional traffic restraint measures over and above the 7% reduction assumed to occur at the time of the implementation of the World Squares project. These sensitivity tests reflect the uncertainty at the time of the development of CRT surrounding plans for levels of traffic restraint within central London, including the impact of congestion charging. The results of these tests show that a further 7% reduction in the number of private vehicle trips ending within the Inner Ring Road would increase vehicle traffic speeds back to those existing before the introduction of CRT.

The overall impact of both the CRT proposals and different levels of traffic restraint in central London are summarised below, by showing the average speed of private vehicle traffic under each scenario.

Alignment engineering study

TfL have carried out a detailed review of the CRT alignment and in consultation with the local authorities derived the traffic priority measures proposed in Section 5 of this report.

In addition to deriving these measures, this study was used to estimate the capital cost of constructing CRT, including the cost of erecting overhead electrification equipment, constructing stops, diverting utilities from beneath the alignment and providing a high quality road surface for CRT. Estimates were also made of the cost of introducing area-wide traffic management measures that would be required to prevent rat-running occurring through residential areas surrounding the alignment.

CRT/conventional bus integration study

Operating costs can represent a significant proportion of the total costs when assessing transport projects. In the cast of CRT, the forecast operating costs are highly dependant upon what assumptions are made about restructuring the existing bus network in the area. This study investigated a number of options for integrating bus and CRT services, although no detailed or definite proposals were derived. Therefore any assumptions that TfL have made are notional and subject to change.

Options assessed by the MCAF

Four options for CRT were assessed in detail using the MCAF methodology:

- **Tram option** – introduce a new tram service over the CRT alignment. Recast and integrate bus and tram networks to increase capacity, reliability and speeds on the priority alignment.

Permit moving buses to use the CRT alignment in specified areas. Introduce open ticketing regime and provide premium quality CRT stops.

The assumed peak service frequency under this option is 40 vehicles/hour between Euston and Waterloo.

- **Trolley bus option** – introduce a new electronically-guided trolley bus service over the CRT alignment. Recast and integrate the conventional bus and trolley networks to increase capacity, reliability and speeds on the priority alignment. Permit other buses to use the CRT alignment except through pedestrianised zones. Introduce open ticketing regime on all buses and provide premium quality CRT stops.

  The assumed service frequency under this option is 80 vehicles/hour between Euston and Waterloo.

- **High Priority High Frequency (best bus) option** - operate Euro III diesel double decker bus service on the CRT alignment in conjunction with "maximum practical" priority for public transport. Introduce minimal alterations to the existing bus network but increase frequency of a number of core routes and permit other buses to use the CRT alignment. Introduce common ticketing regime for all bus vehicles and provide premium quality CRT stops.

  The assumed service frequency under this options is x vehicles/hour between Euston and Waterloo.

- **Existing Bus High Priority option** – operate Euro III diesel double decker bus services on the CRT alignment in conjunction with "maximum practical" priority for public transport. Introduce minimal alterations to the existing bus network but route guided vehicles through pedestrian areas. Introduce common ticketing regime for all bus vehicles and provide premium quality bus stops.
  The assumed service frequency under this option is x vehicles/hour between Euston and Waterloo.

7 Results of evaluation

As outlined in the previous section, a number of individual studies were carried out to establish the effects of the CRT in terms of passenger demand, impact on other highway users, capital cost and the demand for and cost of operating conventional bus services in the area. Elements of each of these studies were then used to carry out the overall multi-criteria assessment of the project. This section presents the results of this multi-criteria assessment with these results presented under the different criteria and sub-criteria used by TfL.

Environmental

Noise impact

Traffic is one of the principal sources of urban noise. The noise impacts of CRT and the associated traffic diversions have been calculated for a number of key selected roads within the study area, which the highway modelling work predicts would be most affected by the introduction of the scheme.

The results of the assessment show that streets where CRT would operate experience significant reductions in noise, while streets used by diverted traffic would experience increases. In terms of the impact of CRT on residential properties, the assessment shows that more residential properties would benefit from the implementation of CRT than disbenefit. Overall, 180 residential properties would experience major noise increases due to traffic diverted by CRT compared to nearly 750 that would experience major improvements.

As a result of the methodology used, it has been assumed that all the CRT options would produce the same level of noise impacts. In reality, additional noise impact benefits would accrue to the Trolley bus option as this vehicle type is quieter than vehicles with internal combustion engines such as diesels. In addition, an assessment has been carried out of the impact of rail noise for the CRT vehicles used in the tram option. This shows that the additional levels of rail noise generated by this option would be below the level at which any residents of adjoining properties would be disadvantaged by their operation.

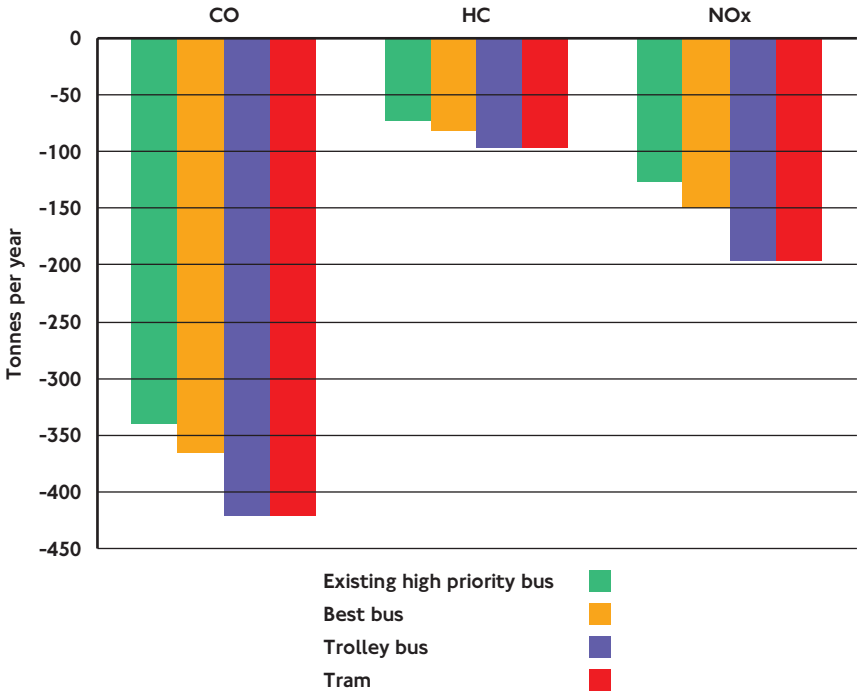
Local air pollution

Transport is a major producer of air pollution. The main local pollutants included in the MCAF are carbon monoxide (CO), hydrocarbons (HC), Nitrous oxides (NOx) and total particulate matter (TPM). Using TfL's Emissions Model, changes in emission levels have been calculated for the four options considered. Changes in emission levels have been calculated for both the point-of-use (exhaust pipe) and production (power station)

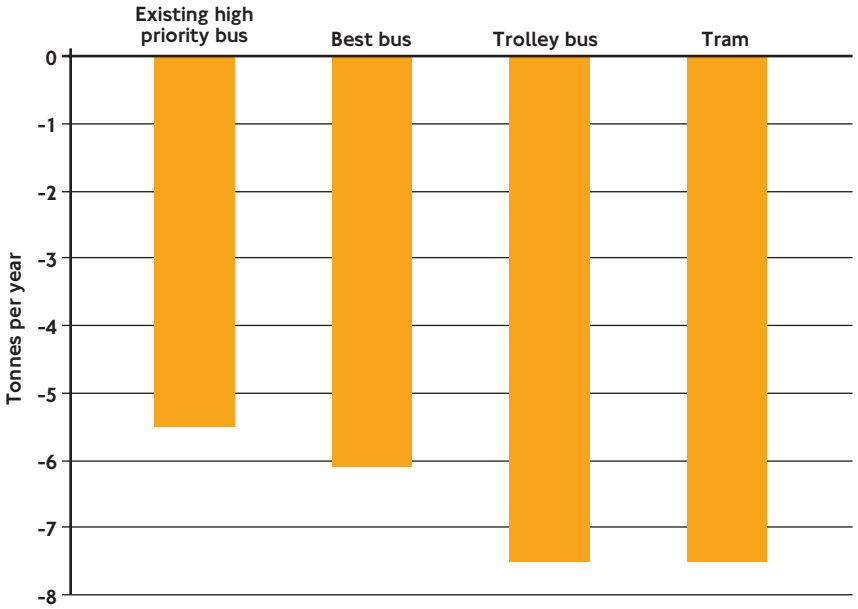
stages of the fuel cycle, although the majority of emissions and the most difficult ones to handle, are produced at the first of these stages.

CRT would provides reductions in the amount of all local pollutants. This is because CRT would reduce overall traffic flows and the CRT vehicles themselves would produce fewer emissions than existing buses. The reason why the difference in emission levels across the different scenarios is very small is that the CRT vehicles would contribute to a small proportion of the total traffic, and therefore to the overall emissions produced in the study area.

Changes in local emissions – CO, HC and NOx



Changes in local emissions – Total Particulate Matter

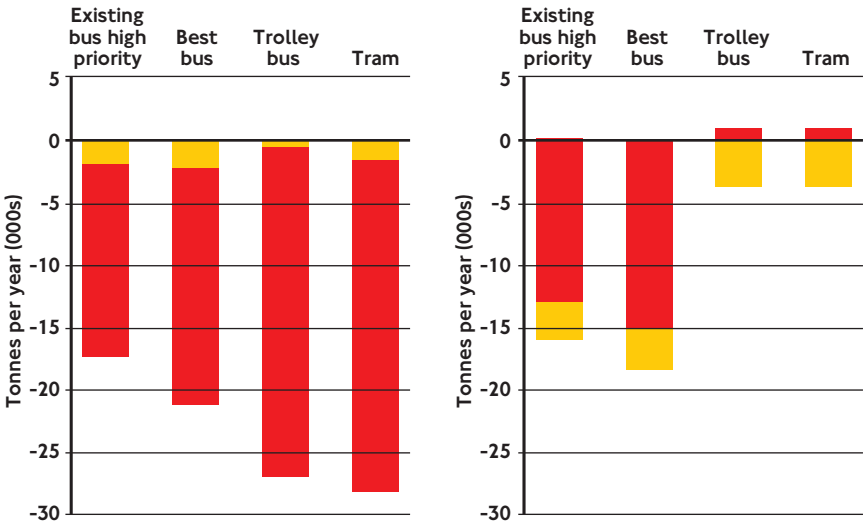


Global air pollution

Two important greenhouse pollutants are produced by road transport- carbon dioxide (CO2) and sulphur oxides (SOx). Using TfL's Emissions Model, changes in global emissions have been calculated for the four options considered. Changes in global emissions have been calculated for both the point-of-use and production stages of the fuel cycle.

The figures below indicate that implementation of CRT would provide considerable benefits in terms of reductions in the amount of global air pollution emissions. The exception would be SOx emissions from the trolley bus option, which is forecast to shows only a small reduction due to the large amount of energy that is required to operate the high service frequency.

In terms of their overall impact, these reductions are categorised as providing a "slight benefit" to reductions in global air pollution.



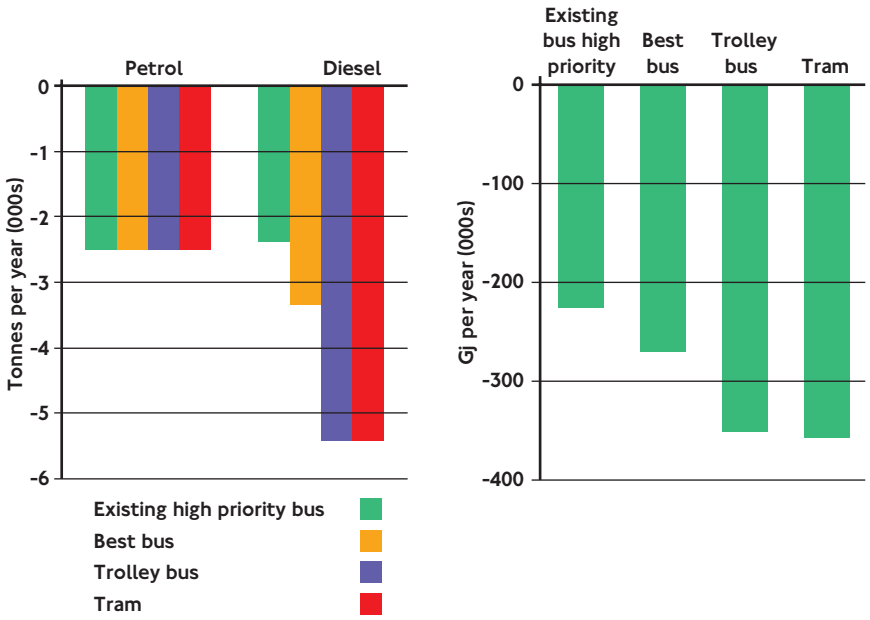
Changes in global emissions – CO_2

Changes in global emissions – SOx

Energy and fuel consumption

Transport is a major and increasing user of energy, consuming about a third of all energy in the UK. The assessment of energy and fuel consumption examines the changes in transport-related energy and fuel consumption for each CRT option, both at the point-of-use and production stages.

The results show that the introduction of CRT would present considerable savings in both energy and fuel consumption. In terms of their overall impact, these reductions are categorised as providing a "x benefit" to energy and fuel consumption.



Changes in fuel consumption

Changes in energy consumption

Land-take

CRT would require very little property acquisition/demolition or land take as the alignment runs on existing highways, with the exception of:

- Burgess Park, where the alignment would cross the park
- Construction of a depot in the King's Cross Railway Lands
- Shop units on a clearance site in Peckham

Overall, CRT would require an estimated land-take of around 71,000 m^2, although those options using electrically powered propulsion would require a small amount of additional land to accommodate power supply substations.

The majority of the land-take (40,000m^2) would be required to provide a depot facility for CRT in the King's Cross area, while the remainder would be largely needed for new traffic management measures, such as junction realignment or the provision of bus and delivery bays, to ensure that CRT had priority over other traffic. Included within the land-take estimate is the loss of road or pavement space that would be needed to

construct CRT's high quality stops. However, these stops would be incorporated into the general pavement areas and would still form part of the street for pedestrian use.

Construction

The construction of CRT would introduce impacts that may be significant for properties located along its alignment. The strength of these impacts will depend upon the nature of the construction work and its duration.

Currently a system such as CRT takes approximately 36 months to construct with work proceeding in phases during that time. Contractors would be required to agree a construction Method Statement with TfL and the local authorities, as well as complying with local Considerate Contractor rules. The duration of highway closures would be minimised and would be subject to agreement with TfL and highway authorities

The majority of the construction work for CRT would be associated with the construction of the necessary traffic management measures. It is estimated that these measures, none of which involve major construction works, would affect approximately 800 properties along the route. If the trolley bus or tram options were implemented, additional construction impacts would arise from the erection of overhead electrification equipment and the construction of the related substations.

Townscape

The main townscape consideration when introducing new transport schemes is to improve and protect buildings and areas, which, by their visual, architectural or historical association, contribute to the local character.

The bus-based CRT options would replace existing buses and stops and it is considered that these would provide an opportunity for increased attractiveness in terms of design. In addition, the trolley bus and tram options would require the installation of overhead electrification equipment and substations, which would cause visual intrusion. However, on the other hand, more attractive vehicles and stops would contribute towards improving the public transport image and the townscape characteristics along the entire alignment. In addition, CRT may provide a catalyst for facade-to-facade upgrading of public spaces, as seen in many mainland European public transport projects.

For the trolley bus option it is concluded that the negative impacts would partially outweigh the positive impacts, giving an overall positive townscape "score" equal to those of the bus options. For the tram option, it is considered that the positive townscape impacts are overwhelming, producing an overall advantage over the other CRT options.

Croydon Tramlink: overhead electrification in residential area

Ecology

Ecology is concerned with the conservation of wildlife species and their habitats.

Bremen, 'green' tramtrack

The ecological impacts of the CRT would arise from the construction of a new segregated alignment across Burgess Park – metropolitan open land and a Site of Nature Conservation Importance. It is estimated that the implementation of the CRT options would create slight severance impacts for local species in Burgess Park, with this effect greater for the bus and trolley bus options, which require the construction of paved bus ways. It is concluded that the severance impact of the tram option would be less as the tracks could be "grassed" and underpasses provided for local species as was done in Croydon Tramlink for badgers.

Over the remainder of the alignment, there would be no measurable ecological impacts.

Safety and security

Accidents

The contribution of CRT to reducing accidents has been calculated on the basis of "equivalent fatalities". This is a standard measure whereby 10 major and 100 slight injuries are each deemed to equal one fatality. Changes in levels of fatalities for both private and public transport have been calculated.

The results show that that the number of annual accidents on public transport would decrease for all the CRT options. In monetary terms, the reduction in accidents provided by the introduction of the existing bus high priority option would represent a saving of £470,000 per year, or £830,000 for the best bus. This compares to a saving of £910,000 per year for the trolley bus and tram options. These accident reductions are achieved by CRT attracting passengers from other public transport modes which have higher accident rates than intermediate modes.

In contrast, CRT is forecast to have a negative effect on private transport accidents. Although each option would achieve some modal shift from private to public transport, this would be offset by increases in private vehicle kilometres travelled due to the re-routing of private vehicles as a result of the traffic measures implemented. Since the method for estimating private transport accident impacts assumes that there is a directly proportional relationship between injury rates and traffic flows, the forecast increases in vehicle kilometres travelled would result in increases accidents. The monetary values of these private vehicle accident disbenefits have been estimated at £781,000 for the existing bus high priority option, £747,000 for the best bus, £645,000 for the trolley bus and £630,000 for the tram option.

Taking both public and private transport accidents together, the existing bus high priority option is forecast to produce an overall disbenefit, while the other three option produce a benefit. This benefit is higher for the

trolley bus and tram options as these are forecast to produce higher modal shift to public transport than the best bus option.

Personal security

It is proposed that CCTV would be installed at all CRT stops and it is assumed that all passengers switching from bus services, cars or newly generated would benefit in terms of increased security. CRT passengers switching from rail modes such as London Underground would not benefit any further, as security measures are already provided for them.

Dependant upon the CRT options, it is estimated that between 10 and 27 million passengers would benefit from improved perception of security with the implementation of CCTV. The reason why benefits for the existing bus high priority option are higher than for the best bus option is that with the former of these option more people switch from bus services, while the best bus option attracts more passengers from the rail modes.

Economic

Cost, journey time change and revenues

Capital costs

TfL has derived the initial capital costs for the four CRT options evaluated by the MCAF. The initial capital costs are defined as the costs incurred during the implementation of the project. Initial capital costs have also been derived for the Base "Do-minimum" situation which represents the capital costs that would be incurred in maintaining and developing the existing bus network in the area.

Initial capital cost breakdown (£ million)

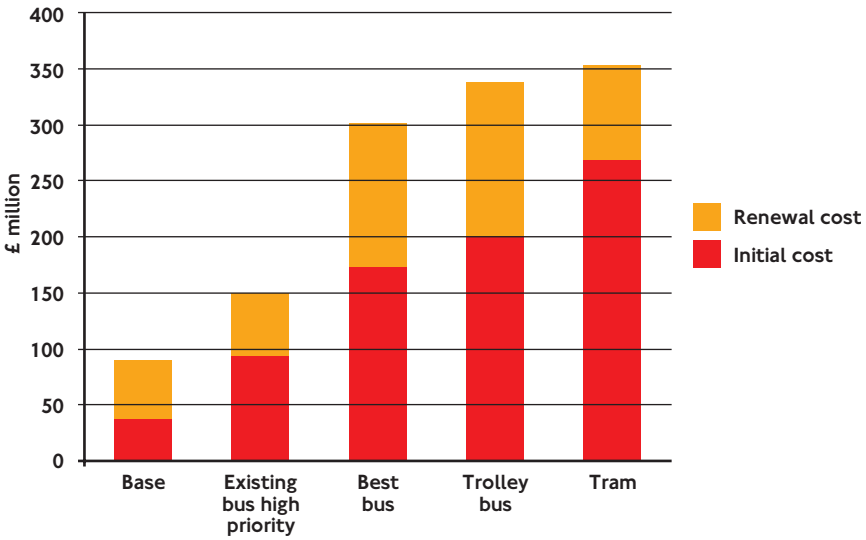
	Base	Existing bus high priority	Best bus	Trolley bus	Tram
Land & utilities		35.5	60.5	60.5	83.0
Civils & tracks		2.3	2.3	5.8	17.2
Stops		2.8	2.8	2.8	2.8
Power supply		0	0	10.8	9.9
Communications		2.6	2.6	2.5	3.0
Vehicles	18.7	17.2	43.7	61.1	84.8
Depot	13.3	12.3	31.2	26.8	22.6
Traffic signalling		3.5	3.5	3.5	3.4
Road reconstruction		1.3	1.3	1.3	1.0
Traffic management		1.5	1.5	1.5	1.5
Design & management	2.3	6.9	10.1	11.1	19.5
Contingency	3.4	8.4	13.3	13.4	19.5
Total	37.6	94.4	172.8	201.2	268.2

Price Base = 1998

Further renewal and replacement costs would also be incurred during the life of the project, including the cost of refurbishing and replacing bus and CRT vehicles. These costs have also been estimated and together with the initial capital costs have been input into the cost-benefit analysis.

The cost-benefit analysis has been carried out on the basis of the incremental cost of each of the CRT options; for example, the initial capital cost of the tram option relative to the base is £230.6 million.

Scheme options: initial capital and renewal costs



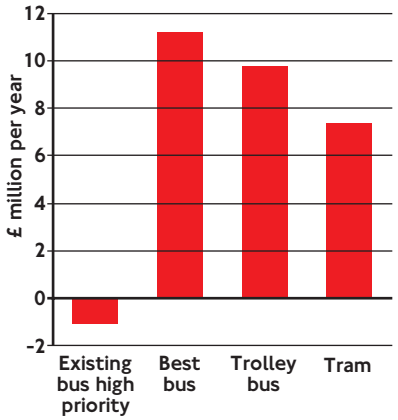
The existing bus high priority and trolley bus options show the highest future costs due to the high number of vehicles required to operate for these options. Overall, the tram option has the highest initial and total cost, followed by the trolley bus option.

Operating costs

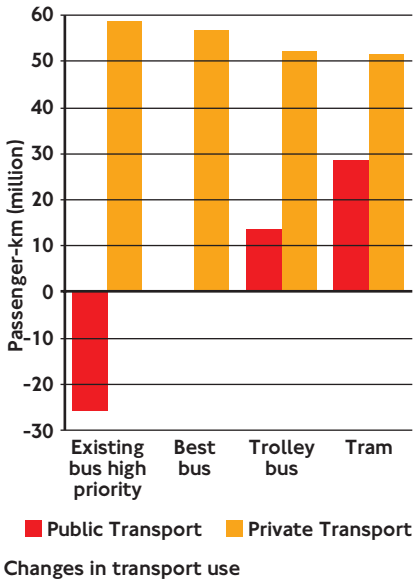
Operating cost changes shown here are net changes that reflect overall changes in costs to both CRT and other bus services in the study area.

With the exception of the existing bus high priority, the other CRT options assume radical restructuring of the existing bus network, including the operation of higher frequency services in the CRT corridor. As a result, the cost of operating the best bus, trolley bus and tram options are forecast to increase significantly over the base "Do minimum" scenario.

It should be noted that the assumptions made about the restructuring of the existing bus network are only indicative. As a result, the operating costs shown here would be expected to change as the bus and CRT networks were optimised at a later date.



Changes in annual operating costs



Changes in transport use

Transport use

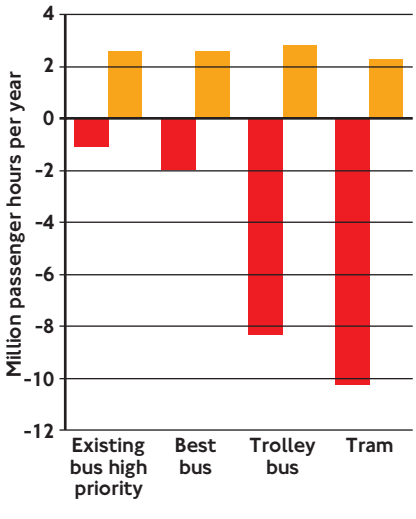
Transport use is measured in terms of passenger-kilometres travelled on both public and private transport. As such it is a very useful measure of the effectiveness of policies to encourage a shift from private to public transport.

The results indicate that CRT would result in a reduction of 26 million public transport passenger kilometres per year for the existing bus high priority option, no change for the best bus option, and increases of 14 and 28 million passenger-kilometres for the trolley bus and tram options, respectively. These figures are very small in percentage terms.

There are two main forces driving these changes in public transport use. By introducing CRT, improvements in public transport are achieved and some public transport passengers transfer to faster modes or routes, which induces a reduction in passenger-kilometres. On the other hand, the effect of modal shift from private transport induces an increase in public transport passenger kilometres. The result of the combined effect from these two forces determines the overall changes in transport use for each CRT option.

In terms of private transport use, CRT is forecast to result in increases of between 51 - 59 million passenger kilometres travelled per year. These increases are a result of the resulting of the re-routing of private vehicles due to the CRT-related traffic management measures, although these are partially offset by some private vehicle trips transferring to CRT.

Overall the transport use figures indicate that the impacts on private transport are dominant over the impacts on public **transport and that the overall effect is an increase in transport use for all CRT options.**



Changes in journey time

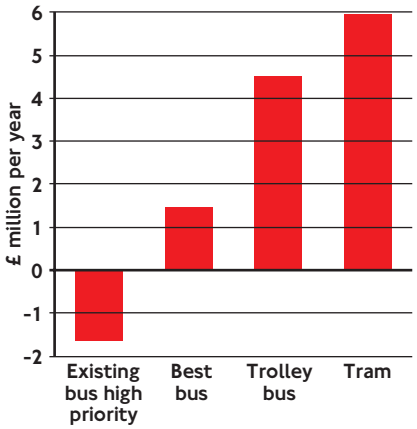
Journey time changes

Journey time is an important element in the analysis of new transport schemes. From the supply side, the objective of most transport schemes is to improve accessibility and reduce journey time while from the demand side, the main journey attributes from the traveller's point of view are cost and time.

Despite the fact that the total number of public transport trips would increase with the implementation of CRT due to modal shift from private transport, the total travel time spent on public transport would decrease by between 1 and 10 million passenger-hours per year. This is primarily the result of the reduced journey times that CRT would achieve due to the introduction of the traffic priority measures.

Conversely, the introduction of these traffic priority measures would increase private transport travel time by between 2.3 and 2.8 million passenger-hours per year with CRT.

Overall, the trolley bus and tram options are forecast to lead to a net reduction in travel, while the existing bus high priority and best bus options would result in net increases in travel.



Changes in revenue

Revenue

The CRT options would result in overall increases in revenue to public transport of between £1.7 million and £5.3 million /year. These increases are mostly the result of additional passengers attracted to CRT due to modal shift from private transport. The figures shown here are net figures that include offsetting reductions in revenue on other modes, particularly bus services.

Cost-benefit analysis

The results of the cost-benefit analysis indicate that using the DETR method of calculation, the following ratios are achieved for the different CRT options:

	Existing high priority bus	Best bus	Trolley bus	Tram
Benefit:cost ratio	-ve benefits	-ve benefits	0.03:1	0.95:1

All the CRT options display benefit:cost ratios of less than 1:1, indicating that the overall costs of the project exceed the benefits, although for the trolley bus and tram options, the benefits accruing to public transport passengers exceed the disbenefits to highway users imposed by increased journey times. However the existing bus high priority and best bus options generate overall negative passenger benefits as the benefits to public transport users from these options are more than offset by the disbenefits to highway users.

The benefit:cost ratios shown above are all depressed by the need to include a large disbenefit to reflect the time-penalties imposed on private vehicle users as a result of the traffic priority measures introduced for CRT; in the absence of this disbenefit, the benefit:cost ratios for all the CRT options, with the exception of the best bus, become strongly positive.

	Existing high priority bus	Best bus	Trolley bus	Tram
Benefit:cost ratio	3.34:1	0.83:1	3.06:1	3.60:1

Transport Capacity

Crowding

The level of crowding is an important aspect of the quality of service provided by a transport system. It indicates whether or not a satisfactory level of service is provided to meet the demand for comfortable travel. The methodology for assessing the effects of crowding on public transport is based on the estimation of the proportion of passengers who experience crowded situations.

The figures shown below indicate that the trolley bus and best bus options would produce the largest benefits in relation to overall crowding reduction, with only marginal benefits produced by the existing bus high priority option. In contrast, the very high numbers of passengers attracted to the tram option would increase overall levels of crowding, although these increases are more than offset by reductions in uncrowded travel time, producing overall benefits.

Accessibility

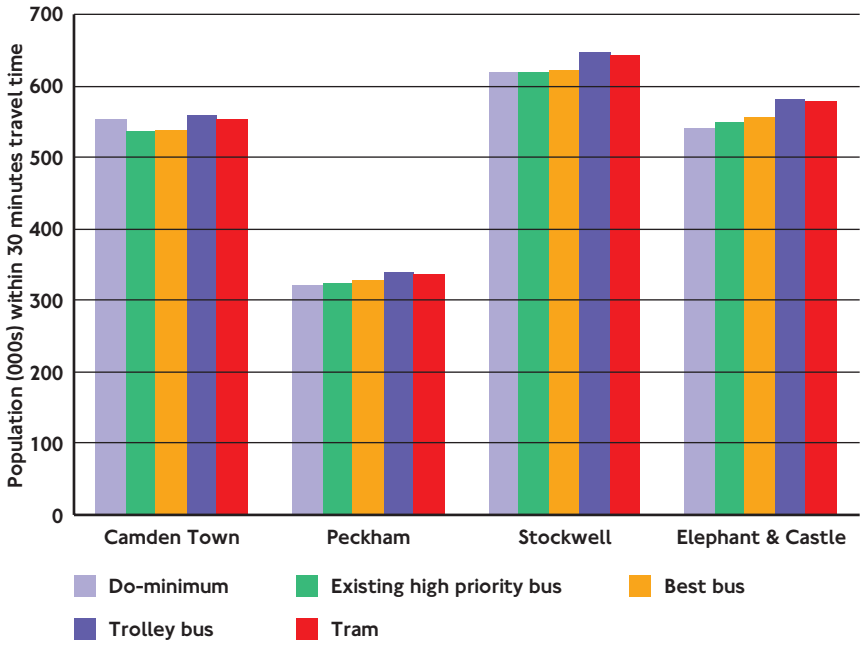
Public transport accessibility

Access to local centres

All the CRT options result in increases in the population within 30 minutes travel time of the major local centres in the study area, as a result of the higher running speeds achieved for both CRT and bus services through the introduction of the traffic management measures. However, these increases are modest in value and reflect the fact that these local centres are already well served by public transport.

The greatest increases in accessibility occur to the Peckham and Elephant & Castle with the trolley bus and tram options. The better performance of the trolley bus option performing is because the higher service frequency offered by this option more than compensates for its marginally slower speed. The existing bus high priority option provides small benefits for travellers to the Elephant & Castle, while the results for the best bus option also show some benefits for travellers to Peckham.

Access to local centres – change in population catchment served



Accessibility to other modes

Community severance

Community severance is measured in terms of the pedestrian delay. Pedestrian delay when crossing a road is mostly the result of the waiting time for a suitable gap in the traffic or for a signal phase, which allows pedestrians to cross over safely.

The assessment shows that for all the CRT options, 60% of the affected road length would experience a reduction in severance compared to 40% experiencing an increase. In particular, the length of road which would become subject to a large increase in severance is equal to only 10% of the road length experiencing a large reduction.

Pedestrian space

Two locations were identified on the alignment where pedestrian flows are high and where the implementation of CRT would potentially affect pedestrian movement significantly. These sites are:

- Camden High Street – opposite Camden Town station
- Southampton Row - north of Holborn

At Camden High Street, with the implementation of CRT, additional pedestrian space would be created at a location where pedestrian flows are currently often saturated. With CRT, flows out of and around the rebuilt Underground station would be considerably improved and pedestrians would be freely able to select their own walking speeds and pass others without any conflict. The impact on pedestrians at this location would therefore be highly desirable.

At Southampton Row, surveys have shown that due to the nature of the pedestrian flows in the area, which are predominantly crossing movements at traffic lights rather than flows along the pavements on Southampton Row, it was not possible to quantify the impact of CRT on the availability of pedestrian space at this site. Nevertheless, it was noted that CRT would be expected to deliver other significant benefits to pedestrians at this location, including reduced pedestrian delay and accident reductions.

Parking and servicing areas

The assessment has shown that CRT would have little significant impact on the availability of parking and servicing space along its alignment. This is because the alignment runs on highways where parking is already severely restricted. In addition, one of the aims of the project is to be neutral in terms of its impact on the availability of parking spaces, by creating as many parking space in a location as lost through the traffic managements measures introduced for CRT.

Integration of policy

Accessibility impact on regeneration and social inclusion

Access to development sites

A major objective of CRT is to improve public transport accessibility to new development sites. The main development sites within the Cross River project area have been identified as:

- North Peckham
- Elephant & Castle
- Euston
- King's Cross
- Waterloo

As was the case with access to local centres, the overall increases are relatively modest and reflect the already high levels of accessibility to these areas. However, if a 30 minute catchment is considered, the changes in population catchments for the trolley bus and tram options are considerable, particularly for Waterloo and Elephant & Castle. Again, the trolley bus options performs best because of its higher service frequency in relation to the other options. The existing bus high priority option provides small benefits for travellers to Waterloo, while the best bus option also shows some benefits to North Peckham and Elephant & Castle.

Access from deprived areas

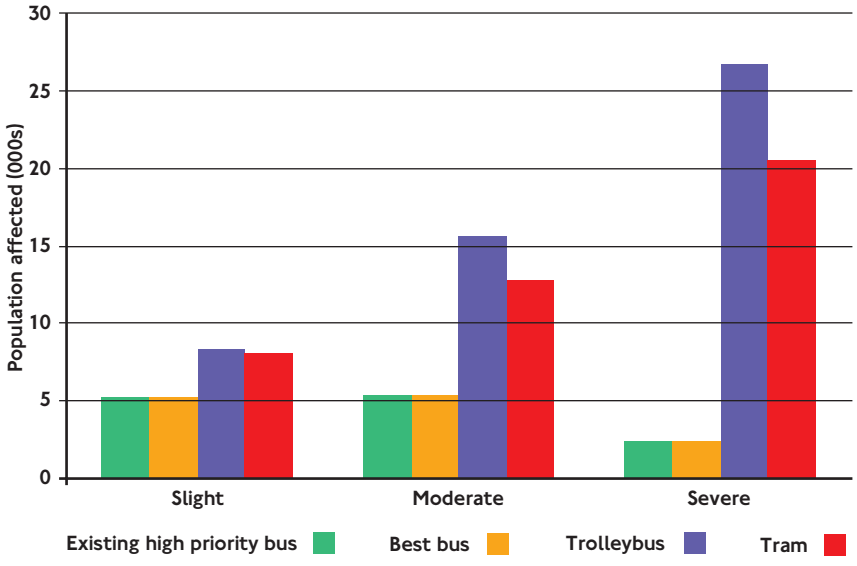
An objective of CRT is to improve access to and from deprived areas, integrated with policies to reduce unemployment, enhance social cohesion and increase social inclusion.

The analysis was based upon calculating the number of people within the deprived population experiencing changes in travel time to reach the nearest local centre as a result of CRT. Deprivation levels are based upon the Index of Local Conditions produced by the Government and for this analysis covers the population living in deprived wards in the boroughs of Camden, Lambeth and Southwark only. It is estimated that the "deprived" population within these three borough is just over 140,000.

Based upon this "deprived" population, the analysis shows that there would be travel time savings for about 10% of the population with the existing bus high priority and best bus options, rising to 30% for the trolley bus and tram options. With the existing bus high priority and best bus options, the maximum travel time saving would be between one and five minutes, rising to ten minutes for the other two options. Under all the options, only a very small number of people living in deprived areas would have their journey times to the nearest local centre increased.

The trolley bus options offers the higher benefits in terms of travel time savings to the "deprived" population purely because of the extremely high frequency service proposed.

Change in access to deprived areas



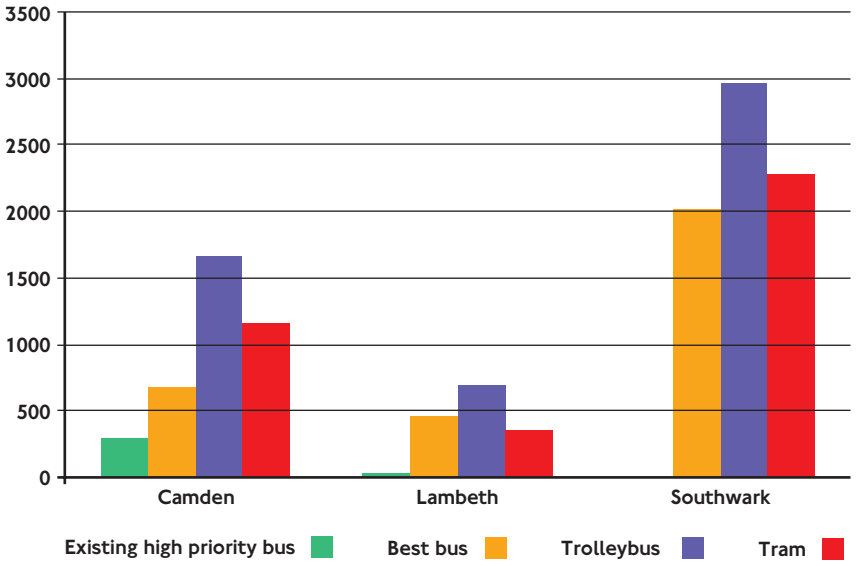
Access to employment

Improved accessibility to employment constitutes an important element of current social policy. It implies therefore that it is beneficial to reduce travel times between areas that can supply labour and areas that require a significant labour force.

For the MCAF application, a methodology was developed that relates the occupational split of residents by ward to the available jobs in all other wards within a 60 minute catchment area. In effect, the method indicates the total number of jobs available within the catchment area based on the occupational characteristics of residents.

The assessment shows that given the already large job catchment for the study area, the changes afforded by CRT are relatively small. This is a reflection, as noted above for access to local centres, of the already high level of accessibility to and within the study area. Of the three boroughs considered by this analysis – Southwark, Lambeth and Camden, Southwark benefits most with increases in the job catchment for the best bus, trolley bus and tram options, while Lambeth benefits the least.

Increase in available jobs within catchment area



Access to tourist sites

The promotion of tourism is a key objective of the Cross River Partnership. In addition, there is the desire to disperse visitors to ease the often high demand at key sites, such as Covent Garden. The implementation of CRT could play a key role in both of these by improving accessibility to tourist sites, particularly those on the South Bank.

All four options exhibit benefits in terms of improved accessibility to tourist sites.

Integration with local policies and plans

Local authorities are committed to following local policy objectives that relate to improvements in various areas of competence. Shown below are the main local policy objectives for both the local authorities within the study area as well as the Cross River Partnership, along with a qualitative assessment of the extent to which the different options contribute towards achieving them.

Objective	Existing bus high priority	Best bus	Trolley bus	Trolley bus
Improve public transport accessibility	✓	✓	✓✓✓	✓✓
Improve public transport services	✓	✓✓	✓✓	✓✓✓
Encourage economic activity of local centres	✓	✓	✓	✓
Provide a cost effective strategy	–ve effect	–	–	✓
Improve the environment	✓	–	✓✓	✓✓✓
Reduce travel times and congestion	✓	✓	✓	✓
Improve safety in the local area	–	✓	✓✓	✓✓

This qualitative assessment suggests that CRT would meet most of the local policy objectives, with a number of objectives being more strongly met by different CRT options.

Although CRT has a role to play in the regional and national context, it is essentially a local scheme and as such it could only provide a small contribution to wider policy objectives.

8 Comparison of intermediate mode schemes

Apart from Cross River Transit, the Multi-Criteria Assessment Framework has been used to evaluate the performance of three other intermediate mode schemes identified for further study in earlier strategic assessments of outer London – East London Transit, Greenwich Waterfront Transit and Uxbridge Road Transit. Although it is not possible to show here the complete MCAF evaluation for each of these three project, this section contains a summary of their performance against a number of the MCAF indicators. The aim of this section is to show the relative performance of Cross River Transit with these other schemes and to identify their relative strengths and weaknesses in meeting their objectives.

Performance against objectives — Performance indicator: High benefit ○ ● ● ● ● ● High disbenefit

	East London Transit			Waterfront				Uxbridge Road			Cross River			
	Existing bus, high priority	Extended network, high priority	Trolley bus	Diesel bus	Trolley bus	Reduced cost trolley bus	Tram	Diesel bus	Trolley bus	Tram	Existing bus, high priority	High quality bus	Trolley bus	Tram
Route length (km)	50	80	80	32	32	24	32	41	40	41	31	31	31	30
Annual boardings (millions)	32.9	37.7	39.3	11.2	11.2	11.7	15.5	33.8	49.7	42	23.5	31.5	63.8	71.5
MCAF ASSESSMENT														
Environment														
Noise	●	●	●	●	●	N/A	●	○	○	○	●	●	●	●
Emissions	●	●	●	●	●	N/A	●	○	○	○	●	●	●	●
Land take	●	●	●	●	●	N/A	●	●	●	●	●	●	●	●
Safety														
Change in equivalent fatalities	●	●	●	●	●	N/A	●	●	●	●	●	●	●	●
Economic														
Initial capital cost/km (£m)	3.0	2.7	3.3	3.8	4.3	2.9	5.7	2.8	4.9	3.3	3.0	5.6	6.6	8.9
DETR Benefit:Cost ratio	0.06:1	1.40:1	1.57:1	0.49:1	0.76:1	1.62:1	0.98:1	-ve	3.48:1	2.58:1	-ve	-ve	0.30:1	0.95:1
DETR Benefit:Cost ratio (highway impact = 0)	10.70:1	2.86:1	2.84:1	0.36:1	0.64:1	2.59:1	0.87:1	3.22:1	5.30:1	5.24:1	3.34:1	0.83:1	3.06:1	3.60:1
Accessibility														
Accessibility to local centres	●	○	○	○	○	N/A	○	●	●	●	●	●	●	●
Severance	●	●	●	●	●	N/A	●	●	●	●	●	●	●	●
Parking and servicing	●	●	●	●	●	N/A	●	●	●	●	●	●	●	●
Integration														
Access to development areas	○	○	○	○	○	N/A	○	●	●	●	●	●	●	●
Accessibility to deprived areas	●	○	○	●	●	N/A	●	●	●	●	●	●	○	○

Environment

Noise

The Uxbridge Road scheme would provide the greatest benefit within its study area, due to the high level of modal shift to public transport and the re-routing of existing trips to the M4 and A40, where fewer properties would suffer disbenefit. Under the East London Transit scheme, high numbers of properties would both benefit and disbenefit from reduced noise levels resulting in a small net benefit. This is a result of significant re-routing of traffic but relatively low modal shift. In contrast, the Greenwich Waterfront scheme would cause little impact since low levels of re-routing and modal shift are anticipated.

Waterloo Bridge – Cross River Transit alignment

Local air pollution

Although each of the schemes would provide a net benefit to properties in terms of reduced local emission levels, the Uxbridge Road scheme would provide the greatest overall benefit. This is a reflection of the high modal shift that this scheme would generate and the re-routing of traffic away from the built-up Uxbridge Road to generally less sensitive routes.

Land-take requirements

The East London and Waterfront schemes require the greatest land-take, although in each case significant proportions of the requirements are for development land. The Uxbridge Road and Cross River scheme require less land-take; however since these schemes pass through more built-up areas, the issues involved with land-take are likely to be more sensitive.

Safety

Accidents

Generally all of the Intermediate Mode schemes are forecast to reduce the overall number of equivalent fatalities, mainly due to modal shift from private transport to safer public transport modes. However, because the level of mode shift forecast for individual schemes is highly dependant upon the type of public transport mode assumed for that scheme, there is considerable variation in the performance of each of the schemes and their options. The greatest reductions in accidents are forecast for the East London Transit trolley bus options and the Greenwich Waterfront and Cross River tram options.

The performance of the Cross River Transit scheme in contributing to reduced levels of fatalities is hampered by the increased private transport fatalities predicted; this is due to the effect of large scale vehicle re-routing under this option.

Economic

Initial capital cost

The Cross River and East London Transit schemes are the most expensive overall. However, the East London Transit scheme is the longest of the schemes and would be cheaper in terms of capital cost per kilometre. The Cross River scheme is also the most expensive scheme per kilometre with the cost of the tram option approaching £9 million per kilometre. The Greenwich Waterfront scheme is also relatively expensive per kilometre – this reflects the high cost of constructing the segregated right-of-way.

Cost-benefit analysis

The cost-benefit analysis produces widely varying results between the intermediate mode schemes. In addition, results vary significantly within schemes as different types of mode technology are considered. Both these variations stem from differences in calculated scheme costs and levels of estimated public transport user benefits.

The Uxbridge Road (tram option) produces the highest benefit:cost ratio overall, of 3.48:1. This is mainly due to the very large public transport user benefits forecast by the modelling assessment.

Of the other schemes, East London Transit produces the next highest ratio – up to 1.57:1 for the trolley bus option. The Greenwich Waterfront Transit scheme fails to produce a "break even" benefit:cost ratio due to the low level of scheme benefits in relation to its costs, which assume the provision of a segregated right-of-way along a major part of the alignment. The reduced cost trolley bus scheme however, shows a benefit:cost ratio of 1.6:1, mainly due to the significant reduction in scheme costs achieved by using the existing highway.

The Cross River scheme also fails to provide a benefit: cost ratio of greater than 1:1 due to the very large highway disbenefits predicted for it under all the different mode options.

For all the schemes, if the highway disbenefits are removed from the ratio, then very high benefit: cost ratios could be achieved.

Accessibility

Accessibility to local centres

All the intermediate mode schemes would improve accessibility to local town centres. The greatest improvement would be achieved by East London Transit which would increase overall accessibility to town centres in the study area by approximately 30%, particularly to Barkingside, Collier Row, Rainham and Harold Hill.

The Uxbridge Road project would result in increased accessibility to each of the local centres in the study area, particularly Hanwell and

Southall. Overall accessibility to local centres would increase by an average of 100,000 people per centre, the greatest absolute impact of any of the schemes.

The Greenwich scheme would also improve accessibility significantly (over 10%), largely due to improved accessibility to Thamesmead.

The impact of Cross River Transit would be smaller due to the high level of current accessibility within central London, although considerable improvements in accessibility to and from Stockwell and Elephant & Castle are forecast.

Severance

Each of the schemes would have a beneficial effect in terms of community severance. This would be greatest for the Cross River scheme, mainly due to the high pedestrian demand within its corridor. The Greenwich Waterfront scheme would have the lowest impact since the scheme has the smallest impact on highway travel patterns.

Parking and servicing

The East London Transit and Uxbridge Road schemes would have large disbenefits in terms of their impact on parking and servicing due to the increased restrictions imposed along much of their alignments. The impact of East London Transit would be particularly large as the alignment extends over a large area. The Greenwich Waterfront scheme would have a low disbenefit since much of this scheme runs on segregated alignment away from the existing highway. The Cross River scheme would cause only low disbenefit due to the tightness of existing parking and servicing regulations.

Access to development areas

Access of the intermediate mode schemes would improve accessibility to proposed development areas within the appropriate study areas.

CRT will improve access to the Elephant and Castle (London South-Central) regeneration area, linking the new job opportunities to some of the areas of highest unemployment and social deprivation in London. It will also provide vital links between Elephant and Castle, and the more developed parts of London and the West End. CRT will also serve the extensive (20??+) Kings Cross Railway Lands development. Regeneration projects along the route will see £7bn invested in areas such as Kings Cross, Elephant and Castle, and Peckham.

Access to deprived areas

Each of the schemes would have a positive effect on access from deprived areas.

The greatest benefits would be provided by the Cross River and East London Transit schemes. Cross River Transit would particularly assist areas to the south of its corridor such as Peckham, Kennington and Elephant & Castle, while East London Transit would improve accessibility to and from a wide area within east London, much of which contains areas designated as being deprived.

9 Conclusions

Analysis of the effects of CRT are encouraging; a large number of people are expected to use the system, significant congestion relief is offered to the Underground, improved accessibility will help deprived areas and major redevelopment sites. **The modal shift of up to 6% from private transport is extremely encouraging,** given the large market share already enjoyed by public transport.

These benefits are achieved by providing a fast, safe and reliable public transport system, this can only be achieved if road space and time are allocated to CRT. Public transport needs uncongested lanes and priority at most junctions along the route if it is to achieve its full potential. Such priority does not need to be universal – **current proposals do not call for a priority at the intersection of CRT and the Euston Road** for instance. However, what is needed is a careful balancing of needs to ensure that the major mover of people is given the benefits befitting its status.

If road space is re-allocated in favour of public transport then it is possible to provide a high-quality system. **Indeed the provision of a significant improvement in public transport quality should be the 'price' paid for the allocation of valuable space by the Highway Authority.** This can reverse the downward spiral of private car congestion leading to unreliable public transport performance and hence more people taking to automobile use, leading to yet more congestion. Breaking that spiral and replacing it with more attractive public transport and a shift away from car use will mean a cleaner, more attractive city for all its inhabitants and visitors.

The results of the multi-criteria analysis show that the objectives set for CRT would be met. Benefits would be realised in improving accessibility to and from major transport interchanges, tourist destinations, regeneration areas and local centres. The environment would be improved and opportunities for significant improvements to the public realm would result.

The introduction of traffic management measures would reduce the amount of through traffic in a number of areas, benefiting local residents and businesses by improving the urban environment and providing greater safety for vulnerable road users and pedestrians. These benefits could be particularly significant in Camden High Street, the Aldwych, Stockwell and Peckham. Improved public transport access to new developments at Kings Cross and Elephant & Castle will assist the planners to ensure that these developments are pedestrian-friendly and avoid domination by the needs of the motor-car.

Each of the technologies considered for Transit has particular advantages and disadvantages. **Conventional buses have the lowest initial capital cost and could be introduced piecemeal. Unfortunately they produce far lower benefits and will cost significantly more over the life of the project.**

Both the electric modes offer significant environmental benefits, as well as a significant improvement in passenger perception. These benefits lead to significantly higher ridership and modal shift. Both options will have to be introduced in a phased programme and will require a more radical reorganisation of existing bus services. They have a higher capital cost, although long-term costs are reduced due to the longer life span of trolley buses and trams. Trams also benefit from the greater manpower efficiency possible by the use of larger vehicles and the reduced demand they will place on priority moves at traffic intersections.

It is TfL's view that the best overall efficiency will be obtained by the operation of a high frequency service of high capacity trams on this system. The peak demand will require 40 trams per hour, per direction, to pass through the central area (ie. a tram every 90 seconds, which matches the existing cycling of the traffic signals). If the same movement of people was to be attempted by the far smaller articulated buses (diesel or trolley) the peak flow through the central area would amount to very nearly 100 buses per hour, per direction (i.e. a bus every 36 seconds). This would result in vehicle bunching and on unreasonable demands being put upon the priority signaling.

Given the extremely dense road network in the central areas of London, it is TfL's view that adequate alternative routes exist for any traffic displaced by CRT. In terms of journey time savings the benefits to public transport users of the introduction of CRT exceed the disbenefits to private motor-car users. It is accepted that further detailed work will be required to mitigate these effects and to ensure that buses running on routes in the central area are not held up in any resulting traffic. This detailed work will also have to take into account expected reductions in central area traffic as a result of the introduction of Congestion Charging.

Using conventional cost benefit analysis only the tram option has a cost benefit ratio of approximately unity. The benefits experienced by a large number of public transport users are outweighed by the high value ascribed to the disbenefits experienced by private motorcar users. However TfL believes that because traffic reduction is now a Government objective the journey time cost of CRT experienced by private vehicle users should not form part of the project evaluation. The effect of the removal of this cost from the equation is substantially to increase the benefit cost of the project.

TfL further believes that cost benefit analysis fails to monetise - and hence take account of - a wide range of issues that should influence investment decisions. This view is endorsed by the Government Foresight Environmental Appraisal Task Force which says that there is need for 'the integration of environmental, social and economic issues into wider sustainability appraisals'. LT and TfL have sought to do precisely this with the present Multi Criteria Assessment Framework.

It is our belief that this Report shows that CRT can pass muster on conventional cost benefit analysis and that the other benefits assessed by the Framework demonstrate that the scheme is worthy of significant public investment to secure its implementation.

10 The Way Forward

The partners in the Cross River Transit project are satisfied that the results of the work summarised in this report enable them to proceed to an initial round of public consultation on this promising scheme. We will seek to find how much public support there is for the scheme and any points of opposition. Potential private sector partners, who would be interested in being involved in the construction and operation of the Transit system, will also be consulted. The results of this process will help us to modify the scheme as necessary to meet any major objections to the proposals. The Mayor and TfL Board will then use this information to decide the future progress of the scheme.

Preliminary public consultation

Preliminary public consultation is intended to give the public the fullest possible information about the scheme, its overall benefits and any adverse impacts. We will be particularly interested in establishing;

- The amount of public support that exists for the principle of re-allocating scarce road space in favour of public transport and pedestrians.
- The level of support for the proposed alignment
- Particular objections raised by residents to any of the current proposals
- Support for the further integration of all public transport and the quality of the interchanges that should be provided
- Support from the public for using the introduction of Cross River Transit as an opportunity to improve the quality of the streets as public spaces, by traffic calming, enlarging pedestrian space, the introduction of street trees and improved surface finishes.

Although much of the detailed planning work on the proposed alignment has been carried out additional work will be needed in a number of areas. This is the case where development plans are being formulated by others at such places as the Kings Cross Railway Lands, the Elephant and Castle, Camden Town and Waterloo stations and Burgess Park. We will also be seeking to work with the highway authorities to ensure that the traffic management proposed for Cross River Transit fits in with wider traffic management schemes. TfL will also need to develop proposals for the integration of bus services with Cross River Transit. These issues– and any raised during the public consultation – will be addressed once it is clear that there is sufficient support for further development work on the scheme.

Seeking expressions of interest from the private sector

The private sector sees Cross River Transit as a potentially very prestigious project. A significant number of well established operators have already expressed an interest in being associated with the scheme. All the major vehicle manufacturers are similarly interested, as are a number of the experienced civil engineering contractors. It is already clear that there will be a satisfactory number of bids of a quality appropriate to this

high-profile scheme, subject to acceptable contractual and financial conditions being available. Further discussions with potential bidders will enable the Mayor and the local authorities to identify a suitable method of implementing the project.

Private sector involvement in similar projects in London, including Croydon Tramlink and the Lewisham Extension of the DLR, has proved successful and has reduced the capital investment required from the public by between 40 and 70%.

TfL will be using the experience gained on previous projects in London to ensure that Cross River Transit is a high quality, well managed public service.

Decision to proceed

The information gathered from the public consultation, discussions with the private sector and with local interest groups will be used by the Cross River Partnership, the local authorities and the Mayor to decide on how they would wish to proceed with the development and implementation of the scheme. The Mayor will also wish to see how the scheme contributes to the objectives set out in his Transport Strategy.

If it is agreed that the scheme is of overall benefit to London then powers to construct the scheme will be sought through an application for an Order made under the Transport and Works Act. This will require further detailed design work, the notification of all frontagers and property owners along the route, the commissioning of an independent Environmental Impact Assessment and a further stage of public consultation once all this work has been completed. The Secretary of State may then order a Public Enquiry if any significant objections to the scheme have been made. A qualified and independent Inspector will conduct the Public Enquiry and make a recommendation to the Secretary of State as to whether powers to construct the scheme should be granted. The process usually takes two to three years, depending on the complexity of the scheme and the number of objections.

Working in partnership

Although the Mayor has indicated his support for the 'Intermediate Mode' schemes in his Transport Strategy it is clear that they cannot progress without strong local support. The active support of Croydon Council and the support for the scheme from the majority of local residents and businesses was critical in the success of Tramlink. The Mayor and TfL will be looking for similar levels of support if Cross River Transit is to proceed. The local authorities will be invited to confirm the commitment they have already made by funding the development work on the scheme by introducing policies and practical measures that will assist in the further progress of the scheme.

Local authorities will need to enter into a formal agreement with TfL before the deposit of a Draft Transport and Works Order. TfL will also be seeking assurance that there is strong cross-party support for the scheme.

This would avoid the risk of any disruption to the programme and costly delay caused by any change of political control during the implementation phase of the project. This approach was adopted in Croydon where a change of majority party resulted in no alteration in support for the scheme. The people of Croydon also feel that Tramlink is their service. The inevitable disruptions during construction were well managed by the Council, with full information and consultation during the works. This minimised economic disruption and ensured that real benefits have been delivered to local residents and businesses. TfL will be looking for the same level of support from the local authorities involved in Cross River Transit when deciding the priority to give to the project.

In the interim TfL will be vigorously pursuing measures to improve bus and taxi operation in a way compatible with the ultimate construction of Transit. Measures will be taken to minimise disruption during construction. TfL will be bringing forward proposals to modify public transport services once Cross River Transit is opened to integrate all services to make best use of all modes to provide higher quality services.

It is the mayor's hope that local authorities will respond with enthusiasm and vision to the opportunities and challenges that are offered by Cross River Transit. If this happens we can go forward together to provide better services to the people of London.